Microcystis: Toxic Blue-Green Algae

What are *Microcystis* blooms and why they are a problem?

Figure 1. Mat of *Microcystis* on the surface of a water body.

Microcystis aeruginosa is a single-celled blue green alga, or cyanobacterium, that occurs naturally in surface waters. *Microcystis* can proliferate to form dense blooms and mats under certain conditions (see Figure 1). Many variants of these cyanobacteria produce multiple toxins including the potent liver toxin, microcystin. When *Microcystis* die, their cells break open, releasing the toxin microcystin into the water. Ingestion of water or algal cells containing microcystin has produced adverse effects in fish, dogs, cats, livestock and humans.

What effects do *Microcystis* blooms have on humans and animals?

People swimming in dense *Microcystis* blooms have experienced irritation such as skin rashes, burns, and blistering of the mouth. Ingestion or inhalation of water containing dense bloom material may cause vomiting, nausea, headaches, diarrhea, pneumonia, and fever. Ingestion of significant levels of the toxin microcystin can cause liver damage and dysfunction in humans and animals. No deaths from ingestion of microcystins have been reported in humans. However, dogs, wildlife and livestock have died following exposure to this toxin.

What causes *Microcystis* blooms?

Microcystis blooms typically thrive in warm, turbid, and slow moving waters. The blooms with the highest biomass occur in waters that are high in nitrogen or phosphorus (eutrophic waters). *Microcystis* also require sufficient light intensity to conduct photosynthesis which results in blooms. In California, cyanobacteria proliferate in the early summer through late autumn and may last for 2-4 months. *Microcystis* may be present in the water in the absence of visible blooms because the mats can sink below the surface.

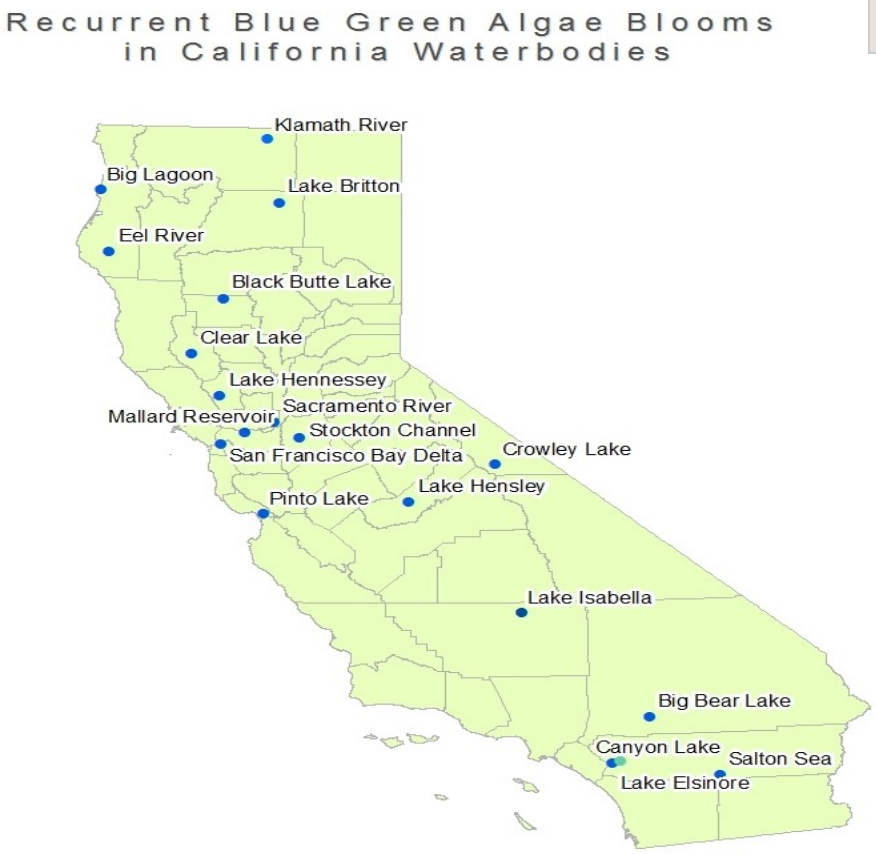
Figure 2. Water containing a microcystis bloom.

How are humans and animals exposed?

Swimming and playing in water that contains, or very recently contained, *Microcystis* blooms are the most likely exposure routes for humans. The highest levels of the liver toxin microcystin typically occur immediately following the die-off of a large bloom, when signs of a bloom may be absent. Children have the highest risk of exposure since they tend to accidently ingest water. Microcystin can move through the aquatic food web, exposing fish and shellfish, as well as the people that consume them. Microcystin does not remain in edible fish and shellfish tissues long-term. However, people that frequently consume sport fish caught from a water body that supports *Microcystis* blooms have a high risk of exposure. Dogs can ingest large amount of *Microcystis* cells when they clean their coats after playing in water. Livestock, wildlife and dogs are exposed through drinking water containing *Microcystis* or the toxin microcystin.

Where have blue-green algal blooms occurred in California?

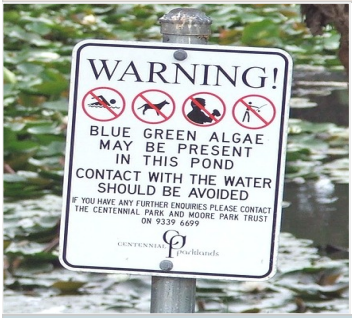
Microcystis blooms are occurring with greater frequency in California. The map identifies the locations of known recurrent algal blooms in our state. The location of blooms identified in the map reference all strains of blue-green algae, including *Microcystis*.



Preventing *Microcystsis* Blooms

Limiting nutrient inputs into waterbodies is one of the key steps that can be taken to reduce blooms. In particular, a nitrogen:phosphorus ratio that is less than 15 parts N:1 part P favors toxic BGA growth. When the ratio of N:P is greater than 20:1, non-toxic algae predominate. Careful use and improved management of fertilizers is a key step to reducing blooms. In addition, increased flushing of waterways by increasing the flow rate is an effective management tool. Moving water or flushing increases mixing of different layers of water within a reservoir/lakes and decreases water temperature, both of which are unfavorable for toxic microcystis. In rivers, any actions that increases flow rate, including removal of dams or releasing pulses of water when possible, will minimize the conditions which foster blooms.

Guidelines for avoiding exposure to *Microcystis* and microcystin



- Never drink from water containing visible blue-green algal blooms.
- Do not allow children or pets to play in water that contain algal blooms.
- Follow the advice on all postings and signs located at waterbodies.
- If you suspect exposure, wash affected area with water and contact a physician.
- If you think a waterway contains microcystin, report it to your local Health Department or Regional Water Quality Control Board.

Sources of Additional Information

Websites with useful information:
General Health: http://ww2.cdph.ca.gov/healthinfo/environhealth/water/Pages/Bluegreenalgae.aspx
Updated information, including newly identified locations, see *Blue Green Algae Voluntary Guidance Document* posted at: http://www.waterboards.ca.gov/water_issues/programs/bluegreen_algae/

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